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Table of Contents

Cover.....	1
SF 298.....	2
Introduction.....	4
Body.....	4
Key Research Accomplishments.....	6
Reportable Outcomes.....	6
Conclusions.....	6
References.....	7

INTRODUCTION

This undergraduate summer training award was designed to fund fellowships to support talented undergraduate students to perform cancer-related research during 10-week summer periods each year. The purpose of this undergraduate training program is to expose talented young students to cancer-related research in the context of a real research laboratory. Each selected student is assigned a faculty mentor, and they participate in a research project in the mentor's laboratory. Students also participate in weekly seminars to learn about topics relevant to breast cancer research, and they give a formal presentation on the work they performed at the end of the fellowship period. The hope is that this program will attract talented young people to train as scientists and pursue cancer research as a career.

BODY

For the summer of 2004, we supported 6 students using these DOD training grant funds; one other participating student was funded by departmental funds. Each student was paid a stipend of \$4,000 for the 10-week fellowship period, and housing was provided near the department by the Texas Research Park Foundation. Each participating laboratory was allocated \$500 to help defray the cost of laboratory supplies for the students' research projects. The participating students were selected from a total of 61 complete applications. Applications were received from colleges in 19 different states; 35 (57%) were from Texas institutions. Fellowship recipients were selected on the basis of college grade point averages, science coursework background, letters of reference and their interest in pursuing cancer-related research. The participants were truly outstanding; the average grade point average (GPA) for the students selected was 3.7 (Range: 3.03-4.0). Below is a list of the participating students and a summary of their research experiences. Two of the six students self-identified themselves as Hispanic on employment documents.

Sean Baran was a sophomore Biochemistry major at the University of Colorado at Boulder. He had previously worked in a laboratory before applying to our program, and is participating in an honors biology program at his institution for his junior and senior years. He worked in the laboratory of Dr. Renee Yew for the summer. His project involved analyzing the function of XDRP1 in *Xenopus*. This protein and its mammalian counterpart is important for controlling cell division, because it influences the degradation of an important negative regulator of the cell cycle. He also participated in a project to co-express and purify Skp1/Skp2 protein complexes. At the end of the fellowship, he presented his work in a talk entitled "Ubiquitination and Degradation of Xic1 in *Xenopus*".

Claire Gordon was a sophomore at Rice University, majoring in both Biology and Psychology. She was assigned to the laboratory of Dr. Tom Boyer for the summer. Claire's project involved investigating the relationship between the Estrogen Receptor α and a previously identified protein that associates with it, called Dbc-1 (Deleted in Breast Cancer-1). Both of these proteins are important in breast tumor formation and progression, and the association is thought to affect the activity of the estrogen receptor

in the absence of the hormone estrogen. At the end of the fellowship period, she presented her work in a talk entitled "Ligand-Independent Modulation of ER α Function".

Nathan Gray was a junior Biology major at Abilene Christian University. Nathan was assigned to the laboratory of Dr. Sang-Eun Lee for the summer. He actually worked on two separate projects in Dr. Lee's laboratory. One involved looking at DNA damage repair in yeast cells, and determining the effects of Ku mutations on this activity. Nathan presented this work at the end of the summer in a talk entitled "Damage Response in Ku70 and Ku80 Mutants". His second project involved looking at a protein complex called RSC (Remodels Structure of Chromatin). RSC mutant cells are defective in end joining, and his work investigated whether the defect was due to an altered cell cycle in the mutants, since different types of DNA repair predominate in different parts of the cell cycle. Nathan presented this work in a seminar entitled "Cell Cycle Assay of RSC Mutants".

Pamela Kim was a sophomore at Vassar College, majoring in Biochemistry. She had previous laboratory experience working as an assistant in the microbiology department at her institution before applying to our program. Pamela worked in the laboratory of Dr. Maria Gaczynska for the summer, and her project involved looking at the mechanism of splicing and ligation of different peptides during antigen presentation. She was able to synthesize and purify peptides and produce highly purified proteasome complex from cells, which she used to try to develop an in vitro system to ligate/splice peptides. At the end of the summer, Pamela presented her work in a talk entitled "The Proteasome: A Multifunctional Protease".

Sonia Martinez was a junior at Texas Lutheran University majoring in both Biology and Chemistry. She was assigned to the laboratory of Dr. Bandana Chatterjee for the summer. Sonia's project involved cloning the human Vitamin D Receptor gene fused to GST (glutathione-S-transferase). The fusion protein produced in this way will be used to pull-down and identify proteins from cells that associate with the Vitamin D Receptor. At the end of the summer, she presented her work in a talk entitled "Generation of GST-Vitamin D Receptor Fusion Protein".

Alan Swearingen was a junior Biology major at St. Edward's University in Austin, Texas. Alan had previously spent a summer performing research at Duke University before applying to our program. Alan was assigned to the laboratory of Dr. Paul Hasty for the summer, where he worked on a project involving the production of various constructs to be used to "knock-out" these genes in mice. Alan did not present his work to the department at the end of the fellowship period, as he was required to return to school early for a varsity soccer preseason camp.

Christopher West was a junior at St. Mary's University in San Antonio, majoring in Biological Sciences. He worked in the laboratory of Dr. Bandana Chatterjee for the summer. Christopher's project was to clone the upstream regulatory region from a metabolic enzyme, human SULT2B1b, into a luciferase reporter construct so that factors controlling the gene's expression in response to cell signaling in various cell types could

be examined. This interesting gene is highly expressed in skin, prostate, trachea and placenta, and may be involved in certain human skin diseases. At the end of the summer, Christopher presented his work in a talk entitled "Cloning of a human cholesterol sulfotransferase promoter".

For the fellowship program for the summer of 2005, we have selected 7 new participants from approximately 80 complete applications. 6 students will be paid from the DOD funds, while one will be paid with departmental funds. The 10-week fellowship period will start on June 6, 2005. The participating students are:

1. Rebecca Breen, Baylor University
2. Jackie Eckblad, University of Wisconsin – River Falls
3. Lydia Endel, St. Mary's University
4. Claudia Garcia, University of Texas – El Paso
5. Kara Helmke, University of Texas - Austin
6. Heather Highland, Trinity University
7. Amy Wollish, Bucknell University

In addition to these 7 students who have committed to participating in the summer program, we initially offered positions to two other students (Mary P. Chang, Rice University and Michael Regan, Vassar College), but they declined to participate based on accepting other offers of summer employment.

KEY RESEARCH ACCOMPLISHMENTS

Since this is a training grant, we do not have any research accomplishments to report. However, in the past grant period, we have advertised our program in a number of ways, received and evaluated student applications, provided summer research opportunities to undergraduate students, organized and participated in educational weekly summer seminars to expose students to breast cancer-related research, and organized formal student presentations at the end of the summer fellowship period.

REPORTABLE OUTCOMES

Not applicable to this training award.

CONCLUSIONS

The Summer Undergraduate Fellowship program at the Department of Molecular Medicine / Institute of Biotechnology of the University of Texas Health Science Center at San Antonio is running smoothly. Last summer (2004) we hosted 6 students using funds from this DOD training award and one student using departmental funds. The students were selected from over 60 complete applications, and spent 10 weeks in a specific laboratory performing biomedical research with a specific faculty mentor. They also participated in a weekly seminar series in which faculty members described their research at a level appropriate for undergraduate students. At the end of the fellowship period, each participating student gave a formal presentation describing the work they had performed during the fellowship. The program was judged to be a success by participating students and faculty alike. For the summer of 2005, we have selected 7 student participants from a total of 79 complete applications. The increased number of

applications may be due in part to better awareness of the program now that it is established. We are looking forward to another successful summer research program this year.

REFERENCES

Not applicable to this training grant progress report.

APPENDICES

No appendices.